Class Practice

ebra 1   Unit 8: Quadratic Functions   Practice

5 – Graphing in Vertex Form

ctice Assignment

Name: _Key_

Date: _____ Block: _____

d the vertex of the following equations:

$= 2(x - 28)^2 + 72$ b. $y = (x + 500)^2 - 250$ c. $y = -(x + 22)^2 + 22$
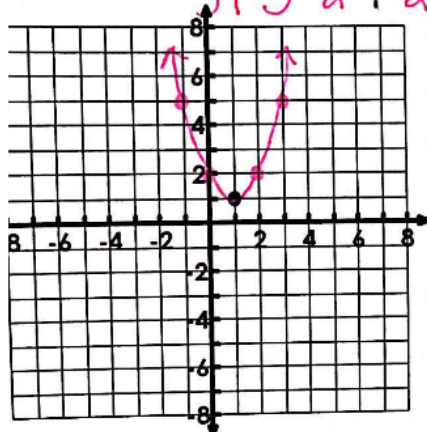
$(28, 72)$ $(-500, -250)$ $(-22, 22)$
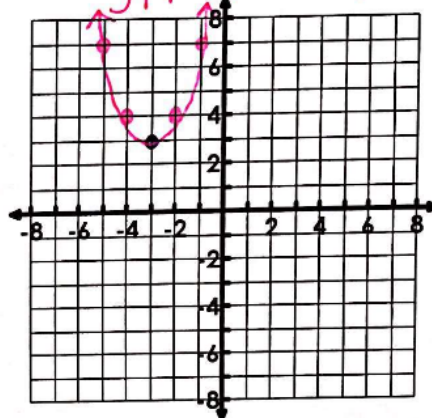
aph the following quadratic functions:

$y = (x - 1)^2 + 1$
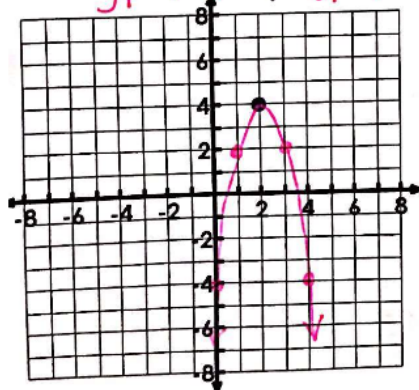
x	-1	0	1	2	3
y	5	2	1	2	5

2. $y = (x + 3)^2 + 3$

x	-5	-4	-3	-2	-1
y	7	4	3	4	7

3. $y = -2(x - 2)^2 + 4$

x	0	1	2	3	4
y	-4	2	4	2	-4

4. $y = -(x + 6)^2$

x	-8	-7	-6	-5	-4
y	-4	-1	0	-1	-4
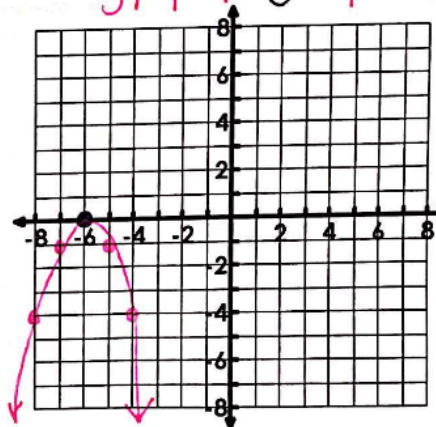
Algebra 1   Unit 8: Quadratic Functions   Practice

Match the graph of a quadratic to an equation:

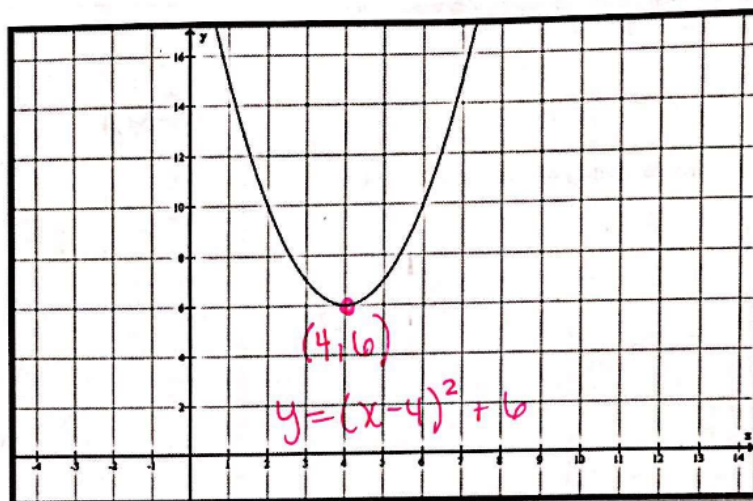Answer: ___B___

Equations:

a. $y = -(x + 4)^2 + 6$

b. $y = (x - 4)^2 + 6$

c. $y = 2(x - 4)^2 - 6$

d. $y = (x + 4)^2 + 6$

(4, 6)

$y = (x-4)^2 + 6$

Review: Factor the following expressions completely.

a. $2x^2 + 16x$

$2x(x+8)$

b. $x^2 - 12x + 36$

$= (x-6)(x-6)$

c. $x^2 - 7x + 6$

$= (x-6)(x-1)$

d. $5x^2 - 10x - 15$

$5(x^2 - 2x - 3)$

$5(x-3)(x+1)$

e. $x^2 + x - 2$

$= (x+2)(x-1)$

f. $7x^2 - 17x + 10$

$\dfrac{7x^2}{7x, x}$ $\dfrac{10}{-5,-2}$ $-1,-10$

$= (7x-5)(x-2)$

g. $3x^2 + 16x + 20$

$\dfrac{3x^2}{3x, x}$ $\dfrac{20}{1,20}$ $2,10$ $4,5$

$(3x+10)(x+2)$

h. $3x^2 + x - 4$

$\dfrac{3x^2}{3x, x}$ $\dfrac{-4}{-4,1}$ $-2,2$

$= (3x+4)(x-1)$

i. $5x^2 - 12x + 4$

$\dfrac{5x^2}{5x, x}$ $\dfrac{4}{-2,-2}$ $-4,-1$

$= (5x-2)(x-2)$

Class Practice

Algebra 1   Unit 8: Quadratic Functions   Practice

Day 5 – Graphing in Standard Form   Name: _____

Practice Assignment   Date: _____ Block: _____

Convert the following equations from vertex to standard form and find the y-intercept:

a. $y = (x - 2)^2 - 8$ b. $y = 2(x + 7)^2 + 1$

Find the vertex of the following:

c. $y = 3x^2 - 18x + 17$ d. $y = -x^2 + 8x - 10$

Graph the following quadratic functions. You must show how you calculated the vertex.
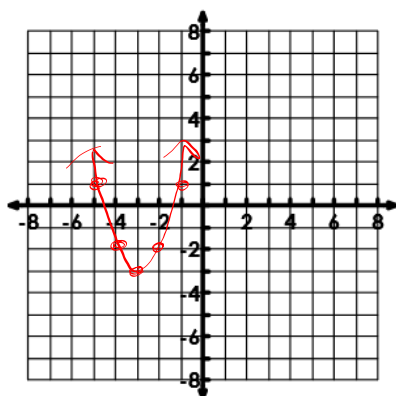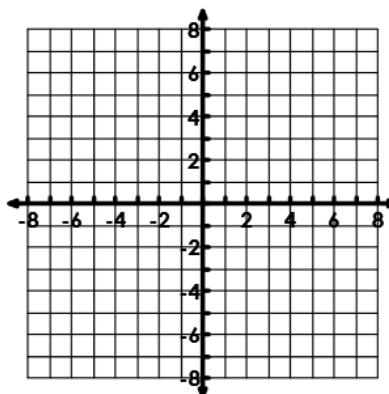
1. $y = x^2 + 6x + 6$ A: 1   B: 6   C: 6   2. $y = -x^2 - 4x - 3$

$$x = \frac{-b}{2a} = \frac{-6}{2(1)} = \frac{-6}{2} = \boxed{-3}$$

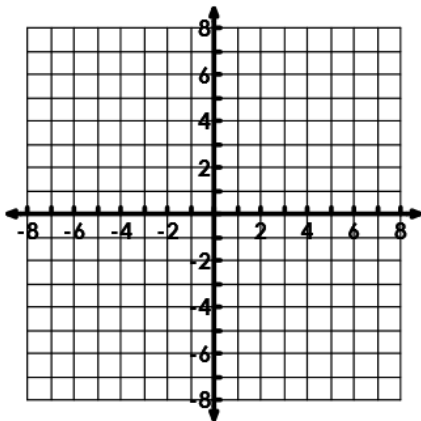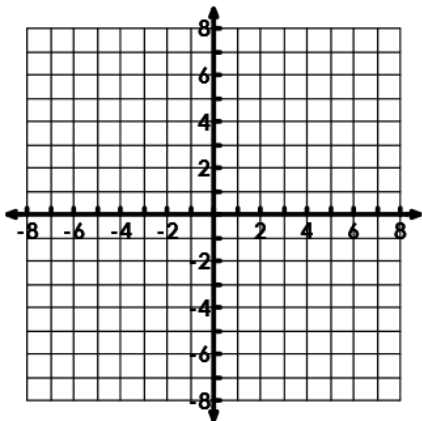$$y = (-3)^2 + 6(-3) + 6 = \boxed{-3}$$

x	y
-5	1
-4	-2
-3	-3
-2	-2
-1	1

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3. $y = 3x^2 + 6x$ 4. $f(x) = -2x^2 - 4x + 1$
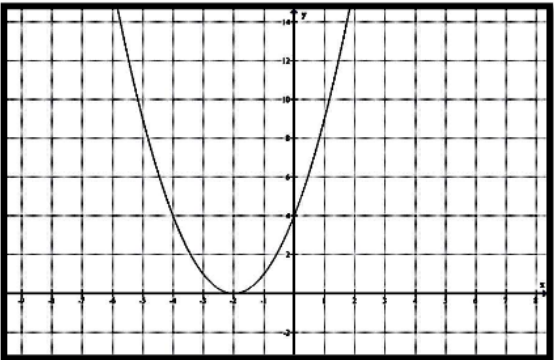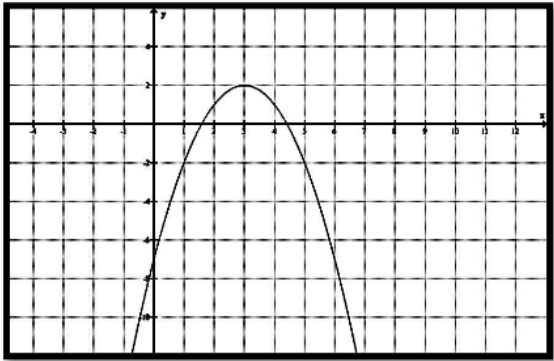
Match the graph of a quadratic to an equation (there will be two answers per graph):

Equations:
a. $y = (x + 2)^2$
b. $y = (x + 3)^2 + 2$
c. $y = -x^2 + 6x - 7$
d. $y = (x + 2)^2 + 1$
e. $y = x^2 + 4x + 4$
f. $y = -(x - 3)^2 + 2$

Answer (top graph)

_____

Answer (bottom graph)

_____

TODAYS NOTES

Algebra 1　　　　　　Unit 8: Quadratic Functions　　　　　　Notes

Day 6 - Graphing Quadratics in Intercept (Factored) Form

Graph the following equations in standard form and then factor the quadratic equation.

Standard form:

1. $y = x^2 - 2x + 1$　　A: 1　B: -2 C: 1

$x = \frac{-b}{2a} = \frac{2}{2(1)} = \frac{2}{2} = \boxed{1}$

$y = (1)^2 - 2(1) + 1 = \boxed{0}$
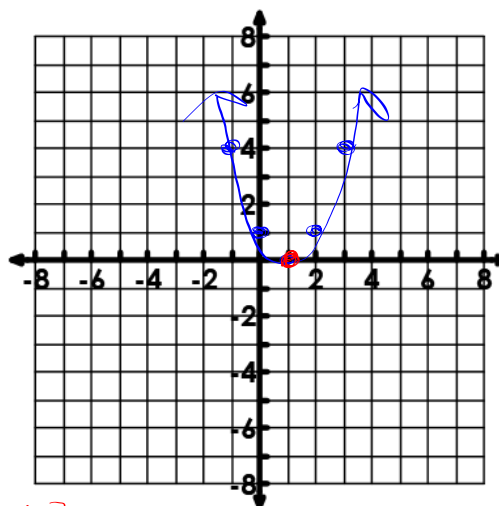
Vertex:

$(1, 0)$

x	−1	0	1	2	3
y	4	1	0	1	4

Factored Form:

$x^2 - 2x + 1$

$(x-1)(x-1) \rightarrow (x-1)^2$

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2. $y = x^2 + x - 6$

Vertex:

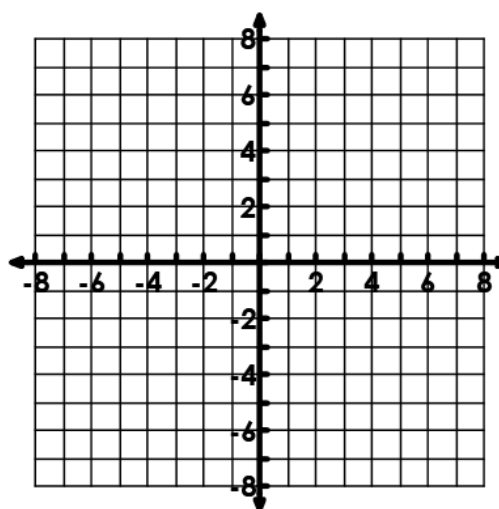| x					
y					

Factored Form:

What did you notice about the factored form and the x-intercepts of the graph?

What do you notice about the x-value of the vertex and the x-intercepts?

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Algebra 1　　　　　　　　　　　Unit 8: Quadratic Functions　　　　　　　　　　　Notes

We learned in Unit 7 how to factor, but we can also graph in factored form!

Factored Form of a Quadratic Function:
$$y = a(x - p)(x - q)$$

$\dfrac{a}{\text{Stretch}}$ Shrink reflect

a determines how the graph opens

&

The x - intercepts are (p, 0) and (q, 0).

Finding the Vertex in Intercept Form

Graphing in factored form is similar to graphing in standard form, but the way we find our vertex is different. We use a special formula to find the x - coordinate of our vertex, and substitute that value in our equation to determine the y - coordinate of our vertex. The formula is:

$$x = \frac{p+q}{2}$$

For example, say we have y = (x + 7)(x + 1), how would we find our vertex?

Identifying the Vertex Practice

Find the vertex for each of the following quadratics and determine the x- intercepts:

1. y = (x +1)(x + 3)　　　x-intercepts: $\underline{x = -1}$ & $\underline{x = -3}$

change the sign

$\dfrac{\text{Middle}}{x = -2}$　　$y = (-2+1)(-2+3) = \boxed{-1}$

Vertex = $\underline{-2, -1}$

2. y = (x + 4)(x – 2)　change sign　x-intercepts: $\underline{x = -4}$ & $\underline{x = 2}$

Vertex = $\left(-1, -9\right)$

$\underline{\text{Middle}}$

$x = -1$　　$y = (-1+4)(-1-2) = -9$

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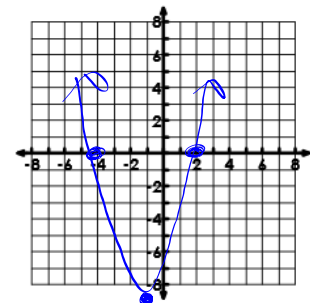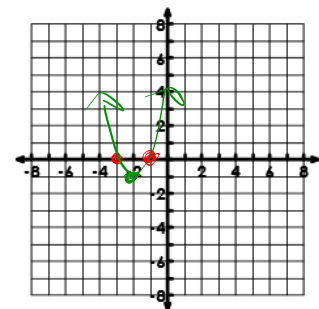
Algebra 1   Unit 8: Quadratic Functions   Notes

$= 3(x - 7)(x + 3)$ x-intercepts: _____ & _____
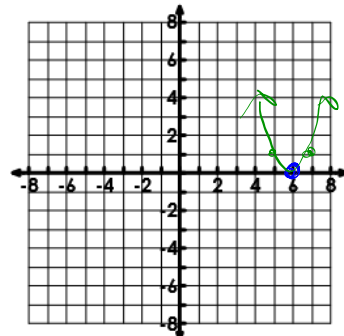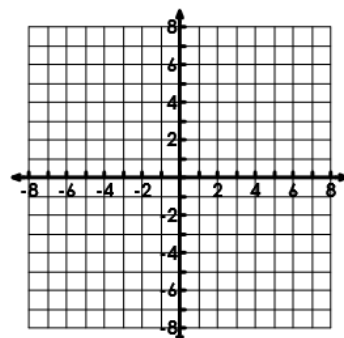
Vertex = _____

4. $y = (x - 6)^2$ x-intercepts: $\underline{\quad x = 6 \quad}$ & $\underline{\quad x = 6 \quad}$

$(x-6)(x-6)$

Find 2 points

$(5-6)(5-6) = 1$ $(7-6)(7-6) = 1$

Vertex = $(6, 0)$

Steps for Graphing in Intercept Form

1. Find the vertex. After using the formula $x = \frac{p+q}{2}$ to find our x- coordinate of our vertex, we substitute that x back into our equation, and our solution is the y-coordinate of our vertex.

2. Determine your two x – intercepts.

3. Plot your points and connect them from left to right!

Graphing in Factored Form Examples

Example 1: Graph $y = (x + 2)(x - 2)$.

x – intercepts: $x = -2$ $x = 2$

Vertex: $(0, -4)$

middle

$\boxed{x = 0}$ $(0+2)(0-2) = \boxed{-4}$
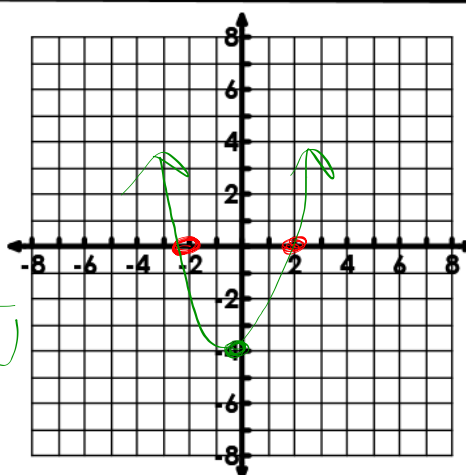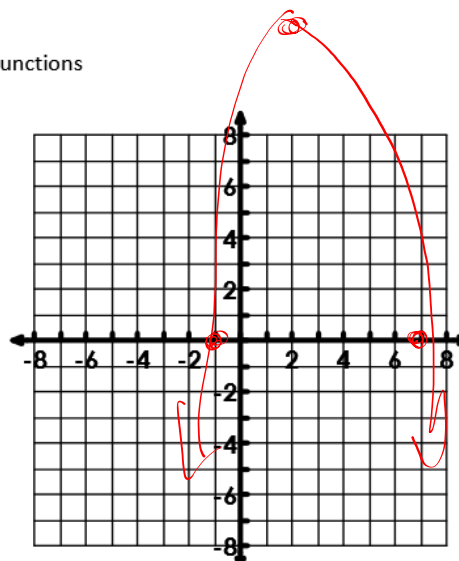
Algebra 1   Unit 8: Quadratic Functions   Notes
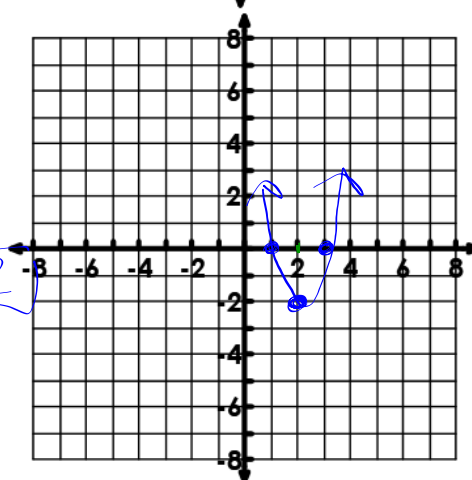
Example 2: Graph: $y = -(x+1)(x-7)$.

x – intercepts: $X = -1$ $X = 7$

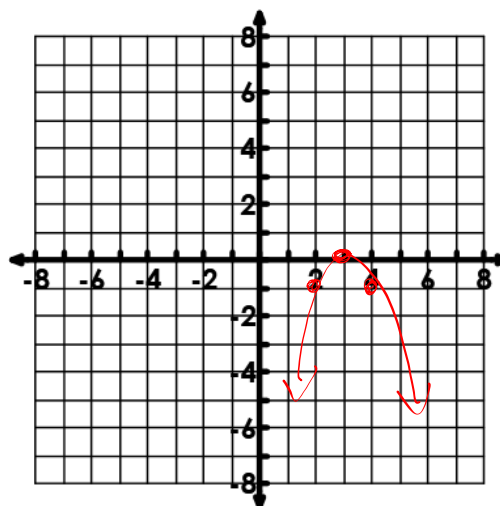Vertex: $(3, 16)$

Middle

$X = 3$ $-(3+1)(3-7) = 16$

Example 3: Graph $y = 2(x-1)(x-3)$.

x – intercepts: $X = 1$ $X = 3$

Vertex: $(2, -2)$

Middle

$X = \boxed{2}$ $y = 2(2-1)(2-3) = \boxed{-2}$

Example 4: Graph: $y = -(x-3)^2$

x – intercepts: $X = 3$

Vertex: $(3, 0)$

Two Points $-(2-3)^2 = -1$

$-(4-3)^2 = -1$

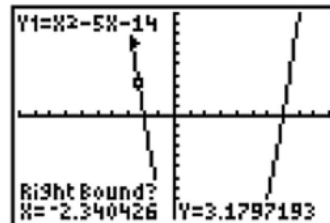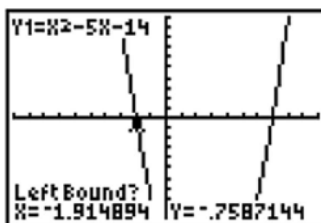Algebra 1   Unit 8: Quadratic Functions   Notes

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Using a Graphing Calculator to find the x - intercepts of Quadratics in Factored Form


We already know how to graph quadratics and find our vertex, so let's try and find the x – intercepts of these equations using our graphing calculators! Graph $y = (x + 2)(x – 7)$

1. Hit **Y =** and enter the equation into y_1.

2. Hit **2nd** followed by **Trace** (you really want the calc function). Select 2: zero.

3. The calculator will ask you "left bound?" hit **Enter** (you may have to move the spider to the left of the intercept using your arrow buttons). The calculator will then ask you "right bound?" (you may have to move the spider to the right of the intercept using your arrow buttons) hit **Enter**. The calculator will then ask you "guess?" hit **Enter**.

4. The coordinates of your intercept will be displayed on the screen!
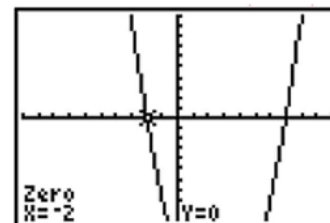
5.   Repeat this process for the other x - intercept, if necessary.

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Practice

Algebra 1   Unit 8: Quadratic Functions   Practice

Day 7 – Graphing in Intercept Form   Name: _____

Practice Assignment   Date: _____ Block: _____

Review - Factor the following quadratic equations:

a. $y = x^2 + x - 30$ b. $y = x^2 - 100$

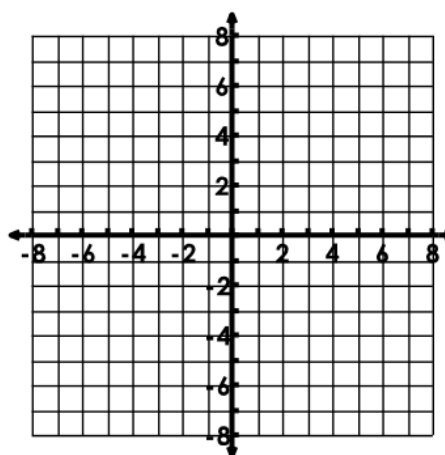
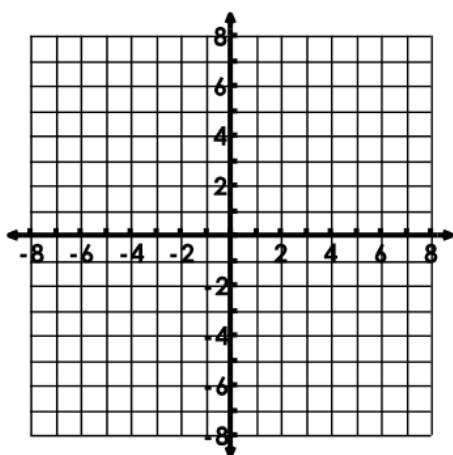**Find the x-intercepts and vertex of the following:**

c. $y = (x + 7)(x - 3)$ d. $y = -(x + 12)(x + 2)$

Graph the following quadratic functions. Show how you calculated the vertex.

1. $y = (x + 1)(x - 3)$ 2. $y = -2(x + 2)(x + 4)$
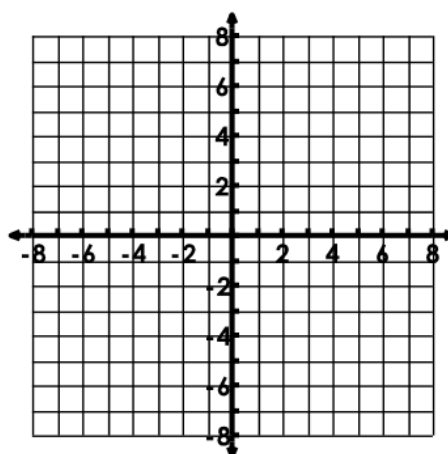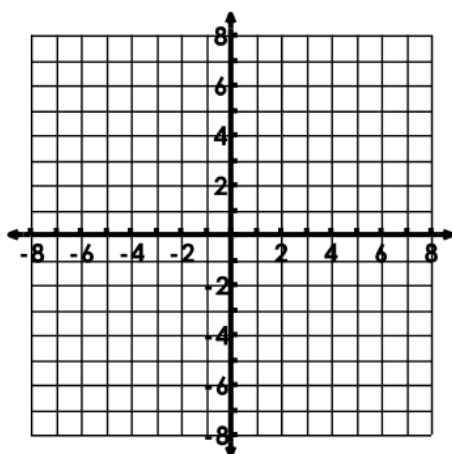
Algebra 1   Unit 8: Quadratic Functions   Practice

3. $y = (x - 5)(x + 3)$ 4. $y = \frac{1}{2}(x + 2)(x - 6)$

Write an equation for the following descriptions or graphs in intercept (factored) form. Assume there are no stretches or shrinks with each graph.
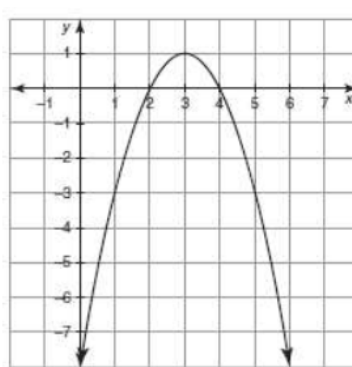
5. Write a quadratic function that represents a parabola that opens down and has x-intercepts of (-2, 0) & (5,0).

6. Write a quadratic function that represents a parabola that opens up and has x-intercepts of (3, 0) and (7, 0).

7.
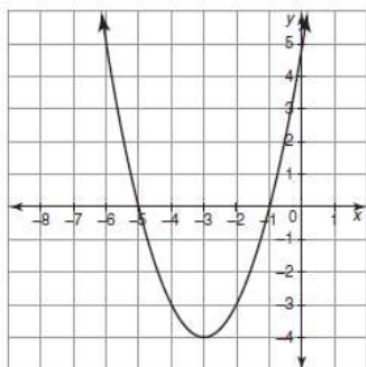
8.

Attachments

Syllabus - Math I A.doc